9. Gradische, near Tepliz, Lower Carniola. Ancient castle with rampart.

10. Gsindeldorf, near Weisskirchen. Numerous tumuli, and traces of ancient dwelling-places; and some few bronze objects.

11. Landstrass, on the River Gurk. Many tumuli.

Besides the above localities of prehistoric dwelling and burial places, six others are known, but not yet explored.

12. Kreuzberg Cave, near Laas. This is very extensive, difficult to get at, and abounding with bones. In four days more than 2,000 bones of *Ursus spelæus*, besides more or less perfect skulls of the Bear, were taken out, belonging to at least from 40 to 50 individuals and possibly to a hundred and more. Most of the bones were scattered, but some remained together, so that a perfect skeleton was obtained for the Imperial Mineralogical Museum. Besides bones and teeth of the cave-bear, remains of *Gulo spelæus* and of a Marten (near *Mustela foina*), also cervical vertebræ of *Lupus*, and coprolites of *Hyæna* were found in this cave.

13. Jellenza Cave, near Tepliz, Lower Carniola. Excavations, August 5th, 1878, showed that this cave had been inhabited by Man.

III. *Bohemia.*—Of late years many antiquities have been met with about Hradischte, near Beraun, probably dating from the Marcomans and their predecessors the Boyans, who lived here apparently for centuries. Their burial-places, the tumuli near Lisek, and the old cemetery near Althütten, with its urns, have to be further explored. T. R. J.

SCIENTIFIC SERIALS

American Journal of Science and Arts, May.—Some experiments in cross-breeding plants of the same variety are here described by Prof. Beal, having been suggested by Darwin's book. The plants were Indian corn and black wax beans.—Prof. Young records observations of the spectrum of Brorsen's comet made on April 1 and 2. He is quite positive that the middle band of the spectrum now coincides sensibly (to a one-prism spectroscope) with the green band of the hydrocarbon spectrum.—Dr. Southworth demonstrates this theorem: If a hydrated salt be dissolved in a given volume of water, the volume of the solution will exceed the original volume of the water by a bulk equal to the bulk of saline water contained in the salt dissolved.—The first portion of a paper by Prof. Norton, on the force of effective molecular action, appears in this number, and the remaining papers deal mostly with geological subjects of more local interest, the Fox Hills Group of Colorado, the Hudson River age of the Taconic schists, the Wappinger Valley limestone of Dutchess County, N.Y., the Huronian series of Northern Wisconsin, the mineral locality in Fairfield County, Connecticut, &c.—Mr. Peters gives observations on the planet he discovered on March 21.

Annalen der Physik und Chemie, No. 4.—Herr Kayser here arrives at the conclusion that the velocity of propagation of sound-waves is independent of the intensity of the tone. His final method (two others, with use of Kundt's dust-figures, having been rejected) was to note the phases of vibration of a piece of mica at the top of a vertical glass tube used for resonance to a tuning-fork above it, set vibrating with different intensities by electric means. Water could be admitted laterally at the bottom of the tube, so as to obtain the maximum resonance. As the water-stopper is displaced, the same figure of vibration always returns whenever the displacement has reached half a wave-length. Herr Kayser finds the velocity of sound in free space 332·5m., calculated by Kirchhoff's formula from velocity in tubes, and making therein $\gamma = 0{\cdot}0235$. (The case of explosion-waves is excluded from consideration, these being quite distinct in kind from sound-waves.)—Herr Wiedemann, in extension of a former research, takes up a number of points relating to torsion; repeated torsion in the same, or in opposite direction, permanent torsion of a wire often twisted a certain amount, influence of weighting during permanent and during temporary torsion, influence of oft-repeated weighting, rotation of molecules, action of vibrations, &c.—Herr Auerbach, considering (from the physiological, psychological, physical, and musical stand-points) what is the absolute number of vibrations required for production of a tone, thinks it is probably about *twenty*.—Herr Schmidt furnishes a new table of gas densities.—Herr Zöppritz continues his papers on hydrodynamic problems in relation to the theory of ocean currents.—Herr Sohncke replies to an objection by M. de Lapparent to his new theory of crystalline structure.—We have elsewhere referred to Herr Elster's researches on the electromotive forces which occur in free water jets.

Atti della R. Academia dei Lincei, March.—We note here the following:—On the secular variation of the magnetic needle at London since the year 1580, by Mr. Jenkins.—Researches on Cinchonine, by Prof. Fileti.—On the atmospheric disturbance of February 24 and 25 last, by S. Respighi.—On prenite and laumonite from the mines of Montecatini, by Prof. Bechi.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti. Vol. xii. fasc. vi.—We note here the following:—Influence of manures on the combustibility of tobacco, by S. Cantoni.—Considerations on the palatine bones, by Prof. Verga.—Some studies with reference to physiology and the expression of attention in man, by Dr. Riccardi.

Fasc. vii.—Rigid suspension bridges, by S. Clericetti.—On the area described by an invariable line moving in a plane according to a determinate law, by Prof. Bardelli.—On arithmetical hemiteria, by Prof. Maggi.—Some reflections on a recent note of Jamin, on the theory of dew, by Prof. Cantoni.—Reflections on the theory of dissimulated electricity, by S. Serpieri.—A steel yard densimeter, by Dr. Chistoni.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 8.—"On the Results of the Magnetical Observations made by the Officers of the Arctic Expedition 1875-76," by Staff-Commander E. W. Creak.

1. After leaving Portsmouth the first magnetical observations were made at Godhavn, Disko. On arrival at winter quarters, observatories were constructed where observations of the three magnetic elements and hourly observations of the differential declination magnetometers were made during the winter.

2. The diurnal variation or inequality of the declination formed one of the chief objects of interest at the winter quarters, as, although the period was remarkable for frequent magnetic disturbances, and an absence of brilliant auroras, no connection could be observed between appearances of that phenomenon and the movements of the declinometer magnet. This accords with the remarks of previous observers within the region comprehended between the meridians of 60° and 90° W., and north of the parallel of 73° N.

3. It has been established that 8 A.M. and 1 to 2 P.M. are the hours of the greatest easterly and westerly deflection of the declinometer magnet in middle latitudes. At the winter quarters, Discovery Bay, the westerly extreme was reached at 10 A.M., the easterly at 11 P.M.

4. An analysis of the disturbances of the declinometer magnet showed that the disturbing force never ceased, that it was at a minimum about the solstice, and a maximum at the equinox, and was greater during the day than the night.

5. Comparing the days of principal disturbance at Kew and at the winter quarters' observatories, it was found that for the most part the disturbances occurred on the same days. The two greatest disturbances or "magnetic storms" occurred on February 19 and March 25-26, 1876, during the same hours of Greenwich mean time as at Kew, but the magnets were often in opposite directions from the normal at the two stations.

6. An important result obtained was the evidence of but small secular change having occurred in the inclination and force since the observations of Kane and Hayes in 1854 and 1861 respectively. The declination is, however, more decidedly changing, especially about Godhavn, the needle moving towards the east as in England.

May 15.—"Note on a Recent Communication by Messrs. Liveing and Dewar," by J. Norman Lockyer, F.R.S.

In my paper of last December[1] I called attention to the importance of discussing Young's observations of the chromospheric lines in connection with the spectra of the metallic elements. In subsequent communications I have given preliminary results of this discussion so far as it has already proceeded.

Since my paper was read Messrs. Liveing and Dewar have, in a paper printed in the last number of the *Proceedings*, given a table which professes to state the number of times various lines in certain metals were seen by Young in connection with certain reversal phenomena observed by themselves.

[1] *Proceedings*, No. 191, p. 172.

The statements, however, made in this table with regard to the visibility of certain lines in the chromosphere do not appear to be in accordance with Young's published tables, and as Messrs. Liveing and Dewar have in a still later paper drawn theoretical conclusions from these statements, I think it desirable to call attention to the fact, in order to prevent any confusion which might otherwise arise.

It will be sufficient to refer to two cases.

I. Messrs. Liveing and Dewar state that two lines of aluminium, the wave-lengths of which they give as 6245 and 6237, have each been seen by Young eight times.

According to Thalén's measurements, which are the best that we possess, there are no lines of aluminium in these positions. He gives, however, lines at 6244·0 and 6234·0.

Young, moreover, states that he saw reversed a strong line (clearly shown in Ångström's map to be an iron line) at 6245·4, and a line which he does not ascribe to any element at 6237·3, which is more than three divisions of the scale from the position of the aluminium line.

II. In the case of potassium, Messrs. Liveing and Dewar give two lines at wave-lengths 4044 and 4042 as having been seen by Young three times. I know of no potassium lines at the places given; Young, moreover, has recorded the reversal of no potassium line in this region. What Young distinctly states he saw, was the reversal of the iron line at 4045·0, which is one of the most marked iron lines in the spectrum of the sun. To this reversal I referred in my paper of December 12.[1]

It is perfectly true that there are two potassium lines in this region: they were not mapped by Thalén, and they were only seen as a single line by Lecoq de Boisbaudran[2] and the wave-length, given as 4045, as his dispersion was limited, did not enable us to determine its true position with reference to the Fraunhofer lines.

Last year, however, I not only stated the double nature of this line on photographic evidence,[3] and pointed out that both components were absent from the spectre normal, but I gave their wave-lengths as 4042·75 and 4046·28 (positions which will only find the last place of decimals altered, even if it be altered, in the revision of the map now being proceeded with), and on the strength of them announced the existence of potassium in the sun. Messrs. Liveing and Dewar do not state whence their wave-lengths were derived, neither do they refer to my communication.

It would appear therefore not only that the reference to Young's work in many cases is founded upon some misunderstanding, but that a higher degree of accuracy than that employed by Messrs. Liveing and Dewar is necessary to determine such coincidences.

I may state generally that my eleven years' work on this special branch has led me to the conclusion that all statements of coincidences between metallic and solar lines with a lower degree of accuracy than that employed by Thalén and Young are to be avoided when possible, as they may be worse than useless, they may mislead. Indeed, though the map on which I am working is on twelve times the scale of Ångström's, it would be better if it were larger; and when I say this I must add my tribute of admiration of the accuracy of the work of those who have preceded me, notably Ångström, Thalén, Cornu, and Young, with whose work I am more familiar, as it is expressed in wave-lengths.

May 29.—"Note on the Spectrum of Sodium," by J. Norman Lockyer, F.R.S.

I have lately been engaged in studying the spectrum of sodium under new experimental conditions. In anticipation of a detailed communication I take leave to state that the vapour given off from the metal after slow distillation in a vacuum for some time shows the red and green lines without any trace whatever of the yellow one. Hydrogen is given off in large quantities, and at times the C line and the red "structure" are seen alone. After this treatment the metal, even when red-hot, volatilises with great difficulty.

Linnean Society, May 1.—Lieut.-Col. Grant, C.B., vice-president, in the chair.—Mr. Edw. S. Morris exhibited a quantity of the berries, whole and ground, of the *Coffea liberica*, grown by him near Monrovia.—A living example of the rare and curious *Welwitschia mirabilis*, reared at Kew, was shown and commented on by Mr. W. T. Thiselton Dyer.—The chairman also called attention to a series of the teaching diagrams illustrating the "Anatomisch-physiologischer Atlas der Botanik," now being issued by Dr. Arnold and Carolina Dodel-Port, of Zurich.—A paper on nutrition in its relations to the fertilisation of flowers, by Mr. Thos. Meehan (Philadelphia, U.S.), was read. His observations chiefly refer to *Wistaria sinensis*, *W. frutescens*, *Catalpa syringæfolia*, and *Limina perenne*, from which he deduces that the struggle for power between the growth or vegetative and the reproductive forces decides fertility. He further suggests that the perfection of the polleniferous organs, and consequent potency of pollen, is dependent on phases of nutrition involved in this struggle. Thus in the above-mentioned plants it is seen that potency in pollen—the main element in the reproductive force—operates only when there has been some check given to the force of vegetative growth.—The Rev. G. Henslow read some remarks on Mr. Meehan's contribution, these in the main supporting his views. He states, with regard to the different facts and interpretation of experiments, that results however accurate and true for one country may be very different for another, as has been shown to be the case with *Escholtzia*. We cannot, therefore, be too cautious in presuming that because a phenomenon may invariably occur in our experience it must necessarily do so everywhere and at all times. He recognises five degrees in the effects of the reproductive force—1. Entire abeyance when no flowers are produced. 2. Flowers abundant, but pollen remains a mass of tissue, as in *Ranunculus ficaria*. 3. Flowers produced with good pollen, but no seed set as in *Escholtzia*. 4. Fruit produced only at definite places, as extremity of raceme, or at definite periods, as late in summer. 5. Flowers and fruit occur in abundance as in "tree" *Wistaria*, or freely growing branches of ivy.—A paper on the structure of the Pouched Rats, of the genus *Heteromys*, by Dr. J. Murie, was read in abstract. The anatomical structure and other peculiarities have been worked out and a comparison with other forms given, along with remarks on the sub-family Heteromyinæ generally.—The Secretary read a note by Dr. M. Masters, on the occurrence of a Restiaceous plant in Cochin China, an interesting fact in the geographical distribution of the group.—Messrs. T. E. Brown (of Adelaide), Richd. Rimmer, and P. O. Shanessy (of Queensland), were elected Fellows of the Society, and two Foreign Members were chosen to fill vacancies.

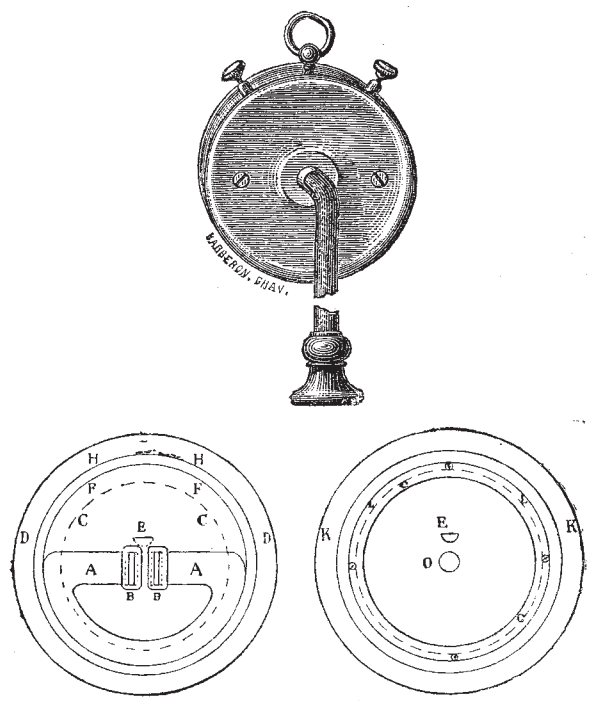
Geological Society, May 14.—Prof. P. M. Duncan, F.R.S., vice-president, in the chair.—The following communications were read:—Further observations on the pre-Cambrian rocks of Caernarvon, by Prof. T. M'Kenny Hughes, F.G.S. The author divides these into (1) the volcanic series, (2) the felsitic series, (3) the granitoid series. He traces the former of these, consisting of coarser and finer varieties, from Caernarvon to near Port Dinorwig. Beyond these come the felsite series, which is overlapped by grits and conglomerates as far as the Bangor Road, north-east of Brithdir. Above the latter comes the "volcanic series," well developed in the neighbourhood of Bangor. The author is of opinion that the Cambrian conglomerate, with associated grits, may be traced in the edge of the older massif from Twt Hill, Caernarvon, to Garth Point, Bangor, and that the beds in each of these places and near Brithdir, recently described as separate, are identical; also that the bed with purple fragments near Tairffynnon and the Bangor Poorhouse are only Cambrian conglomerate faulted down. Further, he considers that the strata of the above three series are fairly parallel throughout, and that they only form three subdivisions of one great series.—Notes on the structure of the palæozoic districts of West Somerset, by A. Champernowne, F.G.S., and W. A. E. Ussher, F.G.S. The authors confirmed the general accuracy of Mr. Etheridge's views as to the structure of North Devon and West Somerset, but differed from him in ascribing the limestone of Cannington Park to the carboniferous, both on account of lithological character, the fossils in Taunton Museum, said to be obtained from it, and the latitude of its position with reference to the carboniferous limestone of the Mendip, South Wales, and the steep and flat Holmes. They described four traverses made by them in West Somerset. 1. From Dulverton to Dunster, in which, proceeding northwards, the following beds were encountered:—Culm-measures faulted against Pilton Beds (upper Devonian), Pilton Beds faulted against Pickwell-Down sandstone (base of upper Devonian), Pickwell-Down sandstones becoming slaty in passing into Morte slates (middle Devonian) and troughed in them by faulted synclines, Morte slates passing into Ilfracombe slates (overlying Hangman grits) near Cutcombe, Hangman grits, evidently

[1] *Proceedings*, 191, p. 172.
[2] "Spectres Lumineux," texte, p. 48.
[3] *Proceedings*, No. 186, p. 280.

faulted against Foreland grits, as no representative of the Lynton beds is present between Oaktrow and Timberscombe. In traverse 2 the fault between the Hangman and Foreland grits is proved by the presence of the Lynton beds in the valley west of Luccot Hill and their conformable infraposition to the Hangman series, and abrupt termination by fault against the Foreland grits of Porlock and Oare Hills. At Oare a patch of schist of the Lynton zone was noticed resting on the Foreland grits on the north side of the fault. The 3rd traverse in the Tone Valley gave the following succession of beds:—Culm-measures on Pilton beds; Pilton beds with grits, much flexured, on Olive slates with *Lingula* and grits with *Cucullæa*, conformably overlying Pickwell-Down grits, which make a conformable junction (following the feature) with the underlying quartziferous slates of the Morte series (middle Devonian); the latter were observed between Huish Champflower and Clatworthy; but, as the middle Devonian slates appear to extend considerably northward in the Brendons, they were not traversed beyond Clatworthy. The 4th traverse from West Quantockshead to Cannington Park proved the composition of the Quantocks along that line to be grits, in places associated with schistose shales, apparently belonging to the Hangman series (middle Devonian); whilst the palæozoic inliers, in the triassic area of Bridgewater, are unlike the Quantock rocks in character. The limestones of Asholt and Hollwell, associated with slates of the Ilfracombe series, are very similar to varieties of the South Devon limestone, and are quite unlike the limestone of Cannington Park.—The Whin Sill of Teesdale as an assimilator of the surrounding beds, by C. T. Clough, F.G.S. Owing to the general absence of mechanical disturbance, the author is of opinion that "the Whin consists in part of altered sedimentary beds, that it partly represents beds which were once in the position it now occupies, that it did not make room for itself simply by thrusting aside these beds, but also by incorporating them into itself." He proceeds to describe sections at Caldron Snout, Cronkley Fell, Noon Hill, &c., which seem to him inexplicable on any other theory. The author discusses objections on chemical grounds, holding that the general uniformity in chemical composition of the Whin may be explained by supposing the absorbed beds to have permeated a large mass of the Whin, as an alloy does melted metal. He thinks the explanation may be extended to other intrusive masses.—On the silurian rocks of the valley of the Clwyd, by Prof. T. M'Kenny Hughes, F.G.S. The author gives a preliminary sketch of the silurian rocks of the southern and western part of the Clwyd Valley. He describes first some beds below the horizon of the Denbigh grits at Ffriddfawr which agree very well in their characters with the base of the Coniston grit, and others near agreeing with the passage-beds between these grits and flags. He next describes sandstones in the Clywedog Valley, the equivalents of the lower grits; and lastly, at Bod Renail, flags, &c., the Pale States, which contain graptolites, and are thus to be identified with the graptolitic mudstones of the Lake-district. Thus he is of opinion there is a basement-series here for the Silurian, corresponding in all its details with that in the Lake-district.

Zoological Society, May 20.—Prof. W. H. Flower, F.R.S., president, in the chair.—Mr. Sclater called the attention of the meeting to several animals and other objects of interest observed by him during a recent visit to some of the zoological gardens on the Continent.—Prof. Owen, C.B., read a paper in which he gave the description of a portion of the mandible of a large extinct kangaroo, proposed to be called *Palorchestes crassus*, from the ancient fluviatile drift of Queensland.—A communication was read from Mr. M. Jacoby, containing descriptions of new species of coleoptera of the family *Halticidæ*.—Mr. Sclater read a paper (the fourth of the series) on birds collected by the Rev. George Brown, C.M.Z.S., on Duke of York Island, and on the neighbouring parts of New Britain and New Ireland. The present collection contained fifty-nine specimens belonging to forty-two species, of which several were believed to be new to science.—A communication was read from Prof. Garrod, F.R.S., containing a series of notes on the anatomy of the Gelada baboon (*Gelada rueppelli*), based on the examination of a specimen that had died in the Society's Gardens. Prof. Garrod came to the conclusion that *Gelada* must be considered as a distinct generic form, more nearly allied to *Cercopithecus* than to *Cynocephalus*.—Lieut.-Col. Godwin-Austen read some notes on and gave a description of the female of *Ceriornis blythi*, Jerdon.

Physical Society, May 10.—Prof. W. G. Adams in the chair.—New Member, Mr. J. Kestrell Evans.—Mr. Wollaston explained the construction of Gower's improved form of Bell's speaking-telephone. The older form, made of wood or ebonite, is open to the objections that it has a very weak voice, soon gets out of adjustment from changes of temperature, and requires a twisted hand-wire which is liable to break. Gower's form has a comparatively loud utterance, is constant, and does not require to be held in the hand, but may be laid on a table or hung on a wall, a speaking-tube leading from it to the operator's ear or mouth. The "call" for attracting attention is also within the Gower telephone itself, whereas in the hand telephone it is an auxiliary apparatus. Every organ of the old telephone has been modified to form the Gower. The magnet A A in the figure in the Gower is of a horse-shoe form, very powerful, the two poles being brought very close together, and each pole is mounted with a small coil of fine wire, B B; the diaphragm C C is much thicker and longer than the Bell diaphragm, the case, D D, is of brass, to expand equably, and a speaking-tube is fitted to the front of the diaphragm. F F is the interior and K K the exterior circumference of the box. The call, E,



consists of a musical reed attached to the diaphragm so as to be opposite a small slit in the latter. To sound the call it is only necessary to send a sharp puff of wind up the speaking-tube, and the reed gives out a note which is heard throughout a room at the distant end. Speaking and cornet music was transmitted by the instrument exhibited, between the third storey over the hall and the meeting. It was very distinct and audible several feet from the receiver. Speaking done some thirty feet from the transmitter was also sent. Conversation was likewise carried on while considerable noise was being made in the room. Prof. Macleod remarked that the timbre of this telephone was very good.—Prof. Barrett then gave an account of some attempts which he had made to overcome the induction clamour on telephones caused by the ordinary telegraph currents on neighbouring wires. He had tried recently the Bell telephone on a line from Dublin to Armagh, ninety-five miles long, but the induction noises completely stifled the speaking, whereas the Edison transmitter gave good results. The clamour could be got rid of either by neutralising the induction currents, or by eliminating the noises from the speech. He had taken the second line of experiment. Since the vocal currents differ from the induction ones in potential and period, he attempted to make the latter discharge across from the line to earth by fine needle points, and from a heated spiral of wire, in a vacuum, leaving the vocal currents to

pass on to the receiver, but without success. Also since the vocal currents are alternately positive and negative, whereas the induction ones are of one sign, he tried to avail himself of the difference in discharging power of positive and negative currents, but without success. He then tried to take advantage of the difference of period or duration of the currents, the induction currents being longer. He therefore tried to break up the induction-currents by interposing a rapidly revolving current interrupter, and to make the sections of the musical note obtained *interfere* with each other by means of an acoustic interference-tube, but practically failed in this also. He mentioned these facts for the benefit of others who may be going over the same ground. Mr. Wollaston pointed out that a perfect cure for induction on underground wires consisted in twisting the going and returning wire of the telephone circuit round each other.—Mr. Wilson then read a paper on the divisibility of the electric light by incandescence. By Joule's law the amount of heat developed in a circuit of resistance, R, by the passage of a current $C = C^2 R$; where R is the resistance of generator and connections, r, added to the resistance of the light emitter or incandescent wire, P. Therefore since by Ohm's law $C = \frac{E}{R}$ we have—

$$C^2 = \frac{E^2}{(r+P)^2}, \text{ and } C^2 P = \frac{E^2 P}{(r+P)^2}.$$

From this equation the value of P may also be determined. $C^2 P$ is the amount of heat developed in the incandescent wire. He infers that the smaller the mass of the wire the higher the temperature generated in it, therefore the mass of the wire should be diminished until the fusing point of the metal is almost attained. The question of divisibility resolves itself into our being able to divide a single incandescent source into a number of smaller ones giving the same total illumination. The author concludes that this can be done by arranging the subdivided sources in "multiple arc" or parallel circuits, provided the total mass, length, and sectional area of the united sources be the same as in the original single source. The objection that increased radiation from the various sources would diminish the first total of light and heat can be met by making the smaller wires still smaller than is theoretically required so as to generate more heat. The author regards the "voltaic arc" as probably falling under the same law, the mass, however, being smaller in this case. —Dr. Coffin then exhibited a Trouvé polyscope, which consists of a small, hand, incandescent platinum wire electric light, designed for illuminating the more inaccessible cavities of the body in surgical examinations. The current is supplied by a Planté secondary battery, and the light is half inclosed in a small silver reflector fitted with a convenient handle. The apparatus is portable. Dr. Coffin found that it was open to several objections which he has remedied. Firstly, the heat generated made the lamp so hot that it could not be held to the body for more than a very short time. He overcame this by making the reflector of double silver plates, and circulating water between by means of india-rubber pipes and a bulb which can be worked by the patient himself, thus serving to distract his attention from the operation. Secondly, the secondary battery exhausts itself in twenty minutes, and the light therefore goes out, while from twelve to twenty-four hours are required to recharge it. Dr. Coffin has superseded it by a Leclanche battery of eight elements, made by Messrs. Coxetter and Sons, in which the carbon pole is replaced by a copper plate faced with platinum, and no porous diaphragm is employed. This gives a constant light for hours.

Anthropological Institute, May 13.—Prof. W. H. Flower, LL.D., F.R.S., vice-president, in the chair.—Mr. Hyde Clarke read a paper on the ethnology, mythology, and philology of races of early culture: Babylonians, Etruscans, Egyptians, Japanese, &c. Pursuing his former investigations, he now produced the comparative philology of Akkad, Coptic, Etruscan, Lydian, Phrygian, Thracian, Carian, &c., copiously illustrated. He showed the relationships of these among each other and with the Ugro-Altaic languages, Georgian, the Himalayan, Naga, Kolarian, and other Indian languages; Basque, the Pomo, Hidatsa, and other American languages. All these he further showed to be related to the numerous languages now spoken in the more advanced highlands of Central and Western Africa, as Mandingo, Bornu, Pulo, Timbuktu, Houssa, Ashantee, &c. By reference to these larger stocks he conciliated the divergences which appeared on the intercomparison of other languages. Thus he illustrated many disputed points in the Akkad grammar of M. Lenormant, and the alleged relations with the Finnic. In treating the murology of the subject Mr. Clarke referred to the marked differences between the Koord, Persian, Armenian, and Eastern Aryans, and the Germanic and other Western Aryans. His conclusion was that the so-called Eastern Aryans are descendants of the pro-existing Turanians, having merely acquired an Aryan language, and are to be assimilated to the Georgian and other white Turanians, to the Assyrians, and the Semites. To them he assigned the Etruscans and Lydians. If the Aryans were to be regarded as descended from High Asia, then the white Turanians may have descended from High Africa, and they were the authors of the early culture. When their power fell, although in Europe and Western Asia they were replaced by the Aryan migrations, yet in other regions they were extirpated by the black and brown (or red) natives. Abyssinia, in conformity with its own legends, was to be regarded as one of the last centres of this ancient empire, and the Himyarite as one of the last invasions under Semitic leaders. To the earlier epochs he assigned the American migrations and the mound-builders, when he considered the Pomo as the possible language. Tracing a like conformity in a primitive mythology as in philology, the author marked out a Turanian epoch of Greece and of Rome, and explained the relation between Etruscan and Norse mythology by the existence of a Turanian epoch of culture among the Germanic nations.—Mr. A. L. Lewis communicated a paper entitled "Notes on some Irish Antiquities." He observed that the country round Dublin, while considered by Irish antiquaries to be comparatively destitute of rude stone monuments, nevertheless contained as many as some of those districts in England where they were most plentiful. In the island of Howth, to the north of Dublin Bay, are the remains of a dolmen called Finns Quoit, the cap-stone of which measured no less than 15 feet long by 6 feet in thickness. South of Dublin, in the ground of Mount Venus, seven or eight miles from the city, is a stone 20 feet long by 3 feet thick, leaning against one 8 feet high. At Killiney Station, on the road to Bray, are remains known as the Druids Altar and Druids Chair. The finest dolmen is in Carrick mines where five upright stones support a capstone 17 feet long by 14½ inside, and nearly 5 feet thick, forming a chamber 10 feet square. In construction these remains resembled those known as the Trevethas Stone in Cornwall. Of tumuli in Ireland the largest sepulchre is probably that known in the New Grange tumulus situated between Navan and Drogheda. Its peculiarities were noticed by the author and contrasted with the remains at Gavr Inis, in Brittany, and with the cuneiform chambers at Wayland Smith, at Wellon, near Bath. Remains that have been observed in the burial-ground of the Abbey Church of Slane, near Navan, were next described, and the paper concluded with some interesting observations on the well-known round towers of Ireland, and with novel suggestions as to their origin and purpose.

Royal Microscopical Society, May 14.—Dr. Beale, F.R.S., president, in the chair.—This was the first meeting in the Society's new room.—Papers were read by Mr. A. W. Waters, F.G.S., on the occurrence of recent Heteropora; by Mr. J. Davis, on a new species of Cothurnia; and by Mr. Wenham, on homogeneous immersion objectives.—The exhibits included photographs of blood-corpuscles, by Dr. Treadwell; Rutley's petrological microscope, by Mr. T. W. Watson; and various microtomes, by Mr. Crisp, &c.—Five new Fellows were elected, and eight nominations read for the next meeting.—The second scientific evening of the session, held on May 21, was very numerously attended, many objects of novelty and interest being exhibited, together with apparatus, amongst which were oil-immersion objectives, by Zeiss and Powell and Lealand.

Photographic Society, May 13.—J. Glaisher, F.R.S., in the chair.—Mr. C. Bennett read a paper in reply to the discussion on a previous paper read by him, on gelatine emulsions. He stated that he still held the opinion that when an emulsion was lightly salted with silver bromide, the particles were fine, and remained so during long emulsification—as also the converse with heavily salted specimens. With respect to the light admitted for working his extremely sensitive emulsion, he found that four square feet of four thicknesses of deep ruby glass were preferable to one square foot of one thickness.—Mr. T. S. Davis, F.C.S., read a paper on preparing small quantities of gelatine emulsion, advocating the admixture of the silver and bromide salts in powder to the gelatine solution instead of previously dissolving them.—Mr. W. S. Bird read a paper on

the photography of vision, showing from researches made by M. Kuhne and Prof. Boll, that a visual purple pigment existed in the eye, and a theory therefrom of a result similar to that in photography, viz., a fixation of an image by physical changes in certain minute rods and cones found in some membranes of the retina, the experiments recorded tending to the old theory that the eye of a deceased person or animal retained the last visual impression.

Statistical Society, May 20.—Mr. Wm. Newmarch, F.R.S., vice-president, in the chair.—The paper read was by Mr. John B. Martin, M.A., banker, of Lombard Street, "On some Effects of a Crisis on the Banking Interest."

EDINBURGH

Royal Society, June 2.—Sir C. Wyville Thomson, vice-president, in the chair.—The following communications were read:—On the carboniferous volcanic rocks of the basin of the Firth of Forth: their structure in the field and under the microscope. Second paper, by Prof. Geikie.—Additional observations on the fungus disease affecting salmon, by A. B. Stirling, Conservator of the Anatomical Museum (communicated by Prof. Turner).—On the form and structure of the teeth of *Mesoplodon layardi* and *M. sowerbyi*, by Prof. Turner.

PARIS

Academy of Sciences, May 26.—M. Daubrée in the chair.—The following papers were read:—On the refraction of obscure heat, by M. Desains. With a view to getting lenses which will cause to converge to a point rays from the beginning and end of the dark spectrum, he tries to follow and recognise in dark spectra a given group of rays, spite of differences in the refringent and dispersive powers of the bodies employed, so as to reach the absolute value of the refractions of dark rays of given length in different diathermanous bodies. Hence may be calculated the radii of lenses of flint and crown glass, *e.g.*, which will give the convergence sought.—Chemical researches on the formation of coal, by M. Fremy. He concludes that coal is not an organised substance; it has taken plant impressions readily, because of its bituminous and plastic nature. The plants which produced coal seem to have first undergone *peaty fermentation*, which destroyed all vegetable organisation, and the coal was formed at expense of the peat, by a secondary action, produced by heat and pressure.—Determination of the difference of longitude between Paris and Berlin, by MM. Lœwy and Le Clerc. Astronomers of the two countries made simultaneous observations in contiguous tents, but with instruments and methods of their own choice. The principal differences of method are indicated. From the French observations (in one series of which M. Lœwy was in Berlin and M. Le Clerc in Paris, in the other *vice versâ*), the ultimate value of the difference of longitude with Cassini's meridian was 44m. 13·99s. (careful tests were applied). This showed a difference of 0·13s. with the German's result, which the authors think due to a slight variation of the optic axis in one or other of the instruments of either mission. From the various longitudes effected in Europe, several values of the longitude between Paris and Berlin may be deduced indirectly, and the authors hope, by discussing these numbers, to arrive at the true value.—On the distribution of work to a distance by electrical means, by M. Tresca. This relates to experiments made at some sugar works. A Gramme machine driven by a steam-engine, set in action another Gramme machine 400 metres or 650 m. off (as desired), and this latter rotated a drum with cable, which worked a double plough. An effective force of 3 horse-power was thus transmitted. The (copper) wire was formed of nine strands 1 mm. diameter, giving a section of 7 square mm. The first Gramme rotated 1,123 times per minute, the second 890.—On earthquakes which occurred in the East from the seventh to the seventeenth century, by M. Tholozan. According to the data obtained, Persia seems to have been most frequently attacked (the other countries are Mesopotamia, Egypt, Syria, Arabia, and Magreb); but one cannot draw very exact conclusions from the records. M. Tholozan, however, is able to contradict von Hoff's assertion that from the beginning of the thirteenth to the second half of the seventeenth century there was almost complete cessation of earthquakes in Syria and Judea; and Quatremare's, that the north-east of Africa has been almost always exempt,—M. Gyldén was elected Correspondent in Astronomy in room of the late P. Secchi.—On the characteristics of functions, by M. Jordan.—On a new representation of imaginary quantities, by M. Dupont.—New demonstration of the law of reciprocity, in the theory of quadratic residues, by M. Schering.—On the development of cot. x, by M. Le Page.—On the fluorescence of salts of earthy metals, by M. Soret. The liquid was placed in a quartz vessel, on which was concentrated, with a quartz lens, the light of the induction-spark passing, *e.g.*, between cadmium electrodes.—On the determination of calorific wave-lengths, by M. Mouton. The method was that of M. Fizeau, freed from the uncertainty resulting from ignorance of the law of dispersion of double refraction of the plate employed in calorific radiations.—On a peculiar mode of transmission of sound to a distance, by M. Decharme. One may, by a purely mechanical process, transmit 5, 10 . . . metres, the different sounds of a vibrating plate, a tuning-fork, or a stringed instrument, by putting these in communication, by means of metallic wires not stretched but in spiral, with suspended sheets of Dutc metal or tin (the fastenings are with wax).—On the diffusion of lithia and its presence in sea-water, by M. Marchand. He claims to have found lithia in sea-water before M. Bunsen did.—On the salts of guanidine, by M. Jousselin.—Experimental researches on the physiological signification of the terminal nervous plexus of the cornea, by M. Ranvier. The arrangement seems simply relative to the transparence of the cornea. The nerves themselves are nerves of general sensibility.—On the metamorphosis of cantharides (*Lytta vesicatoria*, Fab.), by M. Lichtenstein.—On the body-cavity of sedentary annelids, and their segmentary organs; some remarks on the genus Phascolosoma, by M. Cosmovici.—On the *Taenia giardi*, and on some species of the group of Inermes, by M. Moniez.

VIENNA

Imperial Academy of Sciences, March 20.—The following among other papers were read:—On *Cerianthus membranaceus*, a contribution to the anatomy of the Actinia, by Dr. von Heider.—Action of salt solutions on aldehydes (continued), by Prof. Lieben and Herr Zeisel.—On the formation of a rational plane curve of the third order on a conic section, by Prof. Weyr.—On the passage of light-rays in a homogeneous ball, by Prof. Lippich.—On the chemical composition of pyroxilin and the formula of cellulose, by Prof. Eder.—On the relation between heat-radiation and temperature, by Prof. Stefan.—Studies on ellagic acid, by Prof. Barth and Dr. Goldschmiedt.

April 3.—On the methods of investigating the polar actions of the electric current in striated muscle, by Prof. Hering.—On the polar actions of the electric current in muscles deprived of nerves, by Dr. Biedermann.—On phosphate of zinc, by Herr Demel.—On the solution of dynamical problems by means of Hamilton's partial differential equation, by Dr. Hocevar.—Contribution to a knowledge of copper chloride, by Herr Rosenfeld.—Geological description of North-east Thessaly, by Herr Teller.—On some points in geography and geology of European Turkey, by Dr. Boué.—Researches on the diffusion of salt solutions, by Herr Schulemeister.—On resorcindisulpho-acid, by Herr Tedeschi.—Action of melting caustic soda on aromatic acids, by Herren Barth and Schreder.—On derivatives of a phenoldisulpho-acid, by Herren Barth and Schmidt.—On a local influence on the magnetic observations in Vienna in the period 1860–71.

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